



## ARTIGO

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# Instrument processing: knowledge and practice among manicurists/pedicurists

## Processamento de instrumentos: conhecimento e prática entre manicures/pedicures

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### ABSTRACT

**Objective:** to evaluate the knowledge and practices of instrument processing by manicurists/pedicurists in beauty salons in the city of Belo Horizonte, Brazil. **Method:** This was a survey-type cross-sectional research with manicurists/pedicurists, between June 2012 and March 2013 in 235 beauty salons in Brazil. The answers were categorized using the *Statistical Package for the Social Sciences*, by means of descriptive statistics, Pearson's Chi-Squared or Fisher's exact tests, and multivariate binary logistic regression, to analyze the influence of sociodemographic variables. **Results:** The majority (68.1%) correctly defined sterilization; however, the adherence to moist heat (autoclave) was low (35.3%). The temperature and the exposure time to sterilization methods varied, with the majority (44.7%) citing a minimum of 200 °C for 60 to 90 minutes (32.8%). The respondents reported reusing disposable instruments with their customers, but pointed out individual use of instruments as the correct procedure (90.6%). **Conclusion:** Despite their knowledge, professionals practice was inappropriate regarding instrument processing, which can place their own health and that of their customers at risk.

**KEYWORDS:** Beauty and Aesthetics Centers; Podiatry; Exposure To Biological Agents; Universal Precautions; Sterilization

### RESUMO

**Objetivo:** Avaliar os conhecimentos e práticas de tratamento dos instrumentos utilizados por manicures/pedicures em salões de beleza na cidade de Belo Horizonte, Brasil. **Método:** Pesquisa transversal, do tipo inquérito com manicures/pedicures, entre junho de 2012 e março 2013, em 235 salões de beleza. As respostas foram categorizadas e analisadas utilizando o programa *Statistical Package for the Social Sciences*, por meio de estatísticas descritivas, de Pearson teste exato de Fisher, Qui quadrado ou/e regressão logística binária multivariada para analisar a influência das variáveis sociodemográficas. **Resultados:** A maioria (68,1%) definiu esterilização corretamente. No entanto, a adesão ao calor úmido (autoclave) era baixa (35,3%). A temperatura e o tempo de exposição para os métodos de esterilização variaram, com a maioria (44,7%) citando um mínimo de 200 °C durante 60 a 90 minutos (32,8%). Os entrevistados relataram a reutilização de instrumentos descartáveis com clientes, mas apontou a utilização individual dos instrumentos como o procedimento correto (90,6%). **Conclusão:** Apesar do conhecimento sobre o tema, a prática dos profissionais era inadequada no que diz ao processamento de instrumentos, o que pode colocar sua própria saúde e a dos clientes em risco.

**PALAVRAS-CHAVE:** Centros de embelezamento e estética; Podiatria; Exposição a agentes biológicos; Precauções universais; Esterilização

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## INTRODUCTION

Instrument processing is an old practice that has been evolving in its concept, techniques, and technologies to ensure reduction or elimination of potentially pathogenic microorganisms<sup>1</sup>. This practice must be adopted not only by hospitals, healthcare and dental clinics, and doctors' offices, but also by all healthcare services in which there is an imminent risk of transmission of microorganisms, as well as by aesthetics centers, acupuncture clinics, tattoo and piercing studios, and beauty salons<sup>2,3</sup>.

Beauty and aesthetics professionals, including manicurists and pedicurists, frequently process their instruments, such as nail clippers to remove the eponychium (cuticle) and metal spatulas, without following any protocol or recommendation established by national or international health agencies. This type of action places their customers and themselves at risk of crossed transmission of microorganisms, especially those which cause diseases that have a socioeconomic impact, such as Hepatitis B and C, and the Acquired Immunodeficiency Syndrome (AIDS)<sup>3</sup>.

When removing the eponychium, a commonly performed procedure in Brazil, bleeding commonly occurs, thus instruments are contaminated. The sterilization therefore becomes mandatory, considering that the quality of the process depends on an essential sequence that includes decontaminating and cleaning the instruments to remove the organic and inorganic residues, rinsing them with running water and finally drying them. Some studies highlight common problems in beauty salons: the lack of knowledge of professionals regarding the instrument processing and the inappropriate practices due to this lack of knowledge, of materials or of physical resources to comply with processing demands<sup>2,4</sup>.

Given the relevance of this issue and the lack of studies on the issue of material processing in the field of beauty and aesthetics, this study aimed to evaluate the knowledge and practices of instrument processing used by manicurists and pedicurists in beauty salons.

## METHOD

This work consists of a survey-type cross-sectional research with manicurists/pedicurists, between June 2012 and March 2013 in beauty salons in the city of Belo Horizonte, Brazil. The study was approved by the Research Ethics Committee at the Federal University of Minas Gerais (UFMG), under protocol number CAAE - 0195.0.203.000-11.

A single professional per beauty salon in a sample of 235 workplaces was interviewed. This number was calculated according to a Confidence Interval (CI) of 95%, a standard deviation of 0.5, and an estimated maximum error of 0.05 within a population of 600 salons that were duly registered and had received authorization for operations by the Belo Horizonte Adjunct Municipal Department of Urban Assessment in 2010.

Each salon was chosen by means of a simple random selection carried out among the 600 registered salons. Care was taken to map out the beauty and aesthetics centers per neighborhood in such a way as to obtain a sample that was geographically distributed throughout all of the regions of the city, which has a population of 2,375,151 inhabitants.

This research set out, as participation criterion, interviewing only professionals with at least one year of experience, who were above 18 years of age, regardless of gender or position at the salon (owner or an employee).

For the interview, a structured questionnaire (that underwent prior validation by four research examiners) containing multiple choice and open questions divided into five parts was adopted: I - sociodemographic characteristics of professionals; II and III - aspects geared toward practices and knowledge of professionals regarding instrument processing and proper disposal after one single use; and IV - factors which make the adoption of instrument processing and proper disposal after one single use difficult.

The answers were categorized and analyzed using the *Statistical Package for the Social Sciences* (SPSS/PC), version 17.0, by means of descriptive statistics, Pearson's Chi-Squared or Fisher's exact tests, and multivariate binary logistic regression, to analyze the influence of sociodemographic variables, with a value of  $p \leq 0.20$ , considering potential factors associated with knowledge about instrument processing.

## RESULTS

102 of the 600 registered beauty salons agreed to participate in this study, 31 refused, and the rest could not be found at the address provided by the city hall. This led to their substitution with 133 other salons, for making a final number of 235 salons.

The questionnaire was answered by 235 female manicurists, with an average age of 32.6 years, between June 2012 and March 2013. Other sociodemographic variables are listed in Table 1.

The ownership of the instruments used by the manicurists/pedicurists in the participating salons was reported as follows: belonged to the salon and to customers (51.1%); belonged to professionals and to customers (36.6%); belonged to the salon (5.5%); belonged to professionals (5.1%); and, belonged to customers (they had their own "kits") (1.7%).

The majority of professionals (90.6%) found it to be appropriate not to reuse the wooden nail files or toothpicks; the practice of disposal of the instrument was reported in 74% and 52.3% of the cases, for nails files and toothpicks respectively. The use of individual cloth towels among customers was pointed out by 54% of the respondents; the rest reported having used the towels with more than one customer.



Table 1. Sociodemographic profile of interviewed manicurists/pedicurists. Belo Horizonte, 2013.

Sociodemograph variables	Total = 235		Sociodemograph variables	Total = 235	
	N	%		N	%
Gender			Performs the activity in another salon		
Female	235	100	Yes	4	1.7
			No	231	98.3
Age group			Workload/day		
≤ 31 years	119	50.6	≤ 6 hours	21	8.9
> 31 years	116	49.4	8 hours	122	52.0
			> 8 hours	92	39.0
Marital Status			Professional Training		
Single	108	46.0	Informal	155	66.0
Married, living together	107	45.5	Professional training course	80	34.0
Others (divorced, widowed)	20	8.5			
Education level			Training in a wide range of courses		
Elementary School - incomplete	22	9.4	Yes	124	52.8
Elementary School - complete	44	18.7	No	111	47.2
High School - incomplete	36	15.3	Biosafety course		
High School - complete	125	53.2	Yes	65	27.7
Higher Education	8	3.4	No	170	72.3
Number of children			Responsible for family income		
None	84	35.7	Yes	89	37.9
One	60	25.5	No	146	62.1
Two	55	23.4			
≥ Three	36	15.3	Social class association		
Time working in the field			Yes	3	1.3
≤ 10 years	139	59.1	No	232	98.7
> 10 years	96	40.9	Role in the workplace		
Time of work in the visited beauty salon			Informal work	178	75.7
≤ 2 years	138	58.7	Formal work	27	11.5
> 2 years	97	41.3	Partner	18	7.7
			Owner	12	5.1

Biosafety course: course, in the workplace, during a professional course, events; Formal work: job registered with the government; Informal: self-taught, training, and on the job; Informal work: rendering of service not registered with the government; Professional training course: certificate from schools authorized by the Department of Education; Training in a wide range of courses: fingernail decoration, porcelain nails, etc.

All of the manicurists/pedicurists reported sterilizing their instruments. 69.8% cited autoclave as the most effective method of processing available for the beauty and aesthetics segment. However, in only 35.3% of the visited beauty salons the presence and use of an autoclave was identified.

The concept of decontaminating/cleaning and disinfecting was incorrectly defined by the majority of the respondents (50.2% and 49.8%, respectively) as a process of sterilization (64.3%).

Regarding the decontaminating/cleaning of instruments: 0.9% claimed to have used an enzymatic detergent; the majority (34%) highlighted the use of sterilization equipment; (24.3%) reported to have scrubbed with alcohol first and sterilized then; (4.3%) claimed to have immersed in a chlorine solution; and (3.4%) did not take any action. Concerning the knowledge of the cleaning process of the instruments, 42.1% of the manicurists/pedicurists presented correct answers, pointing to the use of soap and water, and 46% claimed to have used this prior to sterilizing these same instruments.

Sterilization was reported by all of the interviewed professionals: the majority still uses dry heat (37%); some use a small oven (24.7%); others also cite the use of moist heat - autoclave

(35.3%); and some mention the use of ultraviolet light, boiling, and household pressure cooker (3%).

The temperature for the sterilization methods was quite variable, with the majority (44.7%) citing a minimum of 200°C, followed by those who did not know how to determine the temperature to be used (27.7%). The exposure time of the instruments to the sterilization process also varied widely, with 32.8% who reported maintaining the instruments for 60 to 90 minutes and 25.2% for less than 30 minutes. The majority of respondents correctly defined sterilization as a process that eliminates all of the microorganisms (68.1%).

When asked about the best method to sterilize the instruments, 70% referred to the autoclave and 61.7% to the autoclave functioning in a temperature/time relation of 121°C for 30 minutes.

Less than half (43%) of the respondents referred to the use of casings for the instruments submitted to sterilization, with 27.7% made of surgical paper, 5.5% of aluminum foil, 4.7% of metal (box), 3.8% of TNT, and 1.3% of PVC film.

In the analysis of the questions about the knowledge of instrument processing and the "used only once" proper disposal of materials, the median of correct answers was 65% and the average 60%.



Table 2 presents the results from the bivariate analysis between the sociodemographic variables and the variable of *knowledge* about instrument processing among manicurists/pedicurists. The data consider the percentage of correct answers (65%, according with the median).

The manicurists/pedicurists that claimed to have received *training in a wide range of courses* (60.5%) and who participated in biosafety courses (72.3%) tended to present more correct answers to the questions on *knowledge* (above 65%). The same was found among professionals who shared the ownership of the workplace with a partner (66.7%).

The multivariate binary logistic regression regarding *knowledge* about instrument processing among manicurists/pedicurists concerning sociodemographic variables revealed that the professionals that claimed to have received *training in a wide range of courses*, *a biosafety course*, and those who were partners in the workplace, presented 2.12, 3.21, and 2.26-fold more chances, respectively, of having knowledge above 65% (Table 3).

**Table 2.** Frequency of the variable *knowledge* (categorized by the median) concerning instrument processing among manicurists/pedicurists (N = 235). Belo Horizonte, 2013.

Variable	total n	Knowledge (> 65%)		
		n	%	p-value
Training in a wide range of courses				
Yes	124	75	60.5	< 0.01
No	111	43	38.7	
Biosafety course				
Yes	65	47	72.3	< 0.01
No	170	71	41.8	
Role in the workplace				
Informal work	178	88	49.4	0.04
Formal work	27	16	59.3	
Partner	18	12	66.7	
Owner	12	2	16.7	

**Table 3.** Final Logistic Regression Model adjusted for the dependent variable of the percentage of correct answers related to knowledge about instrument processing. Belo Horizonte, 2013.

Variables	Knowledge (> 65%)	p-value
	OR (CI95%)	
Training in a wide range of courses		
No		0.01
Yes	2.12 (1.19-3.75)	
Biosafety course		
No		< 0.01
Yes	3.21 (1.63-6.31)	
Role in the workplace		
Informal work		0.04
Owner	0.14 (0.02-0.07)	
Formal work	1.21 (0.50-2.93)	
Partner	2.26 (0.76-6.75)	

OR: Odds Ratio; CI95%: Confidence Interval; L.L.: Lower Limit; U.L.: Upper Limit.

## DISCUSSION

The index of the beauty salons that refused to participate in this study was 15.5%. This result is higher than that from other Brazilian (lower than 4%) or Italian (6%) studies; it is nonetheless lower than that reported in Canada (40%)<sup>2,3,4,5</sup>.

The total group of participants was made up of young women, which corroborates other studies' data indicating this gender profile for this profession<sup>5,6</sup>. The amount of time working in the profession as a manicurist/pedicurist was of 10 years (median), which is higher than what was reported by a prior study<sup>7</sup>. The permanence in the same beauty salon, in the present study, was of only 2 years (median), indicating a high turnover rate in the profession which can be explained by the absence of a formal employment relationship (on the books).

The employment relationship was a relevant characteristic, since the majority of the professionals declared having an informal job (75.7%), which runs in line with the reality of a profession that, though old, only began to be recognized in Brazil in 2012<sup>8</sup>. Moreover, these professionals also face a lack of representation of the class by associations/unions, as evidenced by the fact that 98.7% declared no participation in these organizations.

The respondents (98.3%) reported working only in the beauty salon, which is coherent, since 52% cited a work shift of eight hours/day in the workplace and 39% reported working more than 8 hours/day. However, through the informal reports from the participants, it was found that the work shift could be extended between Thursday and Saturday, when the salons receive a greater customers demand, a fact also reported by other author<sup>4</sup>.

Few (34%) sought out any formal professional course for manicurists/pedicurists. Only 27.7% referred to a biosafety course. This is different from a prior study in which 72% of the respondents reported having taken a specific training course<sup>7</sup>. In the beauty and aesthetics segment, there is generally no obligation to present any type of certification to begin activities and render services, in addition to the lack of regulation of these professions, which could demand a certain educational level.

The manicurists/pedicurists that claim to have participated in a biosafety course presented more correct answers (72.3%) regarding the questions on knowledge about instrument processing and a 3.2-fold greater chance of having this knowledge than those who did not take the course, indicating that the training may well have influenced the question responses. This finding is contrary to that presented in another study, whose authors inferred that the training courses most likely do not prepare the students appropriately regarding biosafety measures<sup>2,3,4,5,6,7</sup>.

In the detailed analysis of the processing of the instruments, only 0.9% of the manicurists/pedicurists referred to the *practice* of decontaminating/cleaning of the instruments with an enzymatic detergent, only 46% with soap and water, and the majority (50.2%) did not know how to define the term. In another study, 86% to 98% of the manicurists/pedicurists performed no decontamination prior to submitting the instruments to the process of



sterilization or disinfection. In none of the beauty salons did the author observe the presence of a written protocol for the proper processing or care of the instruments<sup>2,3,4,5,6,7</sup>.

In the literature, as well as in this study, a wide range of cleaning methods are cited, such as washing with soap and water (37.8%), manual scrubbing with cotton dipped in alcohol (33%), boiling in water with sodium bicarbonate, immersing in warm water, immersing in a household disinfectant (9.2%), and scrubbing with a chemical substance like nail polish remover (6.4%)<sup>2,3,4,5,7</sup>.

The articles used by manicurists/pedicurists are classified as critical, as the rupture of the periungual skin due to the removal of the eponychium can lead to bleeding, thus requiring sterilization<sup>5,6,7,8,9</sup>. These instruments are considered semi-critical when they do not come in contact with blood, allowing for a high-level disinfection; however, scenarios in which the vascular bed is exposed, which is difficult to see with the naked eye, may still occur<sup>5,6,7,8,9,10</sup>.

As regards sterilization, the professionals presented knowledge about sterilization above the median (65%) with 68.1% of correct answers given. All respondents affirmed that they had sterilized the instruments, but only 35.3% cited the use of an autoclave, only because the beauty salon where the professional worked had one. This finding contradicts another study in which none of the manicurists/pedicurists was able to define the concept of sterilization or knew how to score the difference between a drying oven and an autoclave. The use of the autoclave has also been low, as judged by the findings from other authors, varying from 1% to 34%, even when the professionals affirmed that they had sterilized the instruments (83.5%)<sup>5,6,7</sup>. The low adherence to using the autoclave may well be due to the high cost when compared to drying ovens, the absence of legal obligation within sanitation norms, or even due to the low level of knowledge of the process itself<sup>4,5,6,7</sup>.

The practice of sterilizing by the dry heat method has risen, varying from 53% to 84% in other studies carried out with manicurists, pedicurists, podologists, hairdressers, and barbers<sup>2,3,4,5,6,7,11</sup>. The “small oven” equipment is inappropriate, as it creates an internal heat without any means to control the temperature or the exposure time. This method is also reported in another study with participation of 11% of the respondents<sup>3</sup>. The use of this equipment is relatively frequent, and its indication is for household chores due to its lack of safety for the function proposed within a beauty salon.

One aspect to be considered in the inappropriate processing of the instruments is related to the insufficient number of instruments, a condition which worsens during the peak days and times of customers in the salons, with no sufficient time or human resource to disinfect or sterilize them<sup>4,5,6,7</sup>.

In this study, the answers from the respondents regarding the time and temperature of the exposure of the instruments in drying ovens or autoclaves were quite variable, demonstrating less knowledge than necessary, an outcome corroborated by other studies<sup>4,5,12,13</sup>.

Among the 235 manicurists interviewed, 100% claimed to have sterilized their instruments, which is different from the indexes highlighted in other studies, varying between 13% and 49%, and between 10% and 30% for barbers, hairdressers, and podologists. The most commonly cited methods by barbers were alcohol in diverse concentrations, flaming, or “Javel water” (sodium hypochlorite), and it was observed that the respondents had poor level of knowledge about sterilization and disinfection procedures<sup>4,5,6,7,12,14</sup>.

Ultraviolet light, boiling, and household pressure cookers were also cited as “sterilization methods” by 3%. Similar results were found among manicurists/pedicurists in Brazil and Canada<sup>2,3,4,6</sup>.

As regards the casings for sterilization and conditioning of the instruments, lack of knowledge and inappropriate behavior were observed, using the casings incorrectly and storing the instruments inside different pieces of equipment (autoclaves, drying ovens, and “small oven”) or in inappropriate places. The same was also observed by other authors<sup>15</sup>.

The practice of sharing cloth towels among clients was revealed in this study and in another carried out in Pakistan (66% of barbers)<sup>13</sup>.

## CONCLUSION

The absence of laws, guidelines, or manuals to advise these professionals as regards correct cleaning, disinfection, and sterilization, contributes to a variety of techniques and practices that are often incorrect. It must be considered that in some cases the manicurists/pedicurists do not use the recommended processes for the instruments, because their workplaces do not own such equipment or do not provide proper conditions; this reason was nonetheless not reported by the respondents in this study.

The present study therefore suggests a broad campaign to provide clarifications for beauty and aesthetics professionals in Brazil and for the general population about biosafety measures, especially as regards instrument processing, given the social relevance and risks inherent within this activity. Moreover, the drafting of legislative regulations for the professions of manicurist/pedicurist, of sanitation laws to be drawn up for the sector, as well as of the demand for a minimum regular/formal technical educational background, is of utmost importance, considering the vast social importance of the profession.



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